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THE ROLE OF EDUCATION IN DEVELOPMENT AND EUROPEAN COOPERATION WITH LATIN AMERICA

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ABSTRACT:

In this paper we present a quantitative approach, based on econometric studies of production functions, for the evaluation of human capital on economic growth . After the research from Denison(1980), Lucas (1988), Mankiw and Romer(1992), Barro and Lee(1996),Guisan(1997) and Neira and Guisan(1997), we develop a method for measuring the impact of education of men and women on development., taking into account the increases in production due to human capital and the moderation of birth rates as a consequence of both a higher level of education of the population and a higher level of female employment in secondary and terciary sectors of activity. So education has a very positive impact on the growth of income per inhabitant, increasing the rate of income growth and diminishing the rate of population growth.

We analyse the situation and perspectives for development in Latin America and stand out the importance of increasing the resources devoted to education in order to achieve the goals that need to be met for a good level and quality of life for the population

on these countries. We follow the studies published by Arranz, Freire and Guisan(1996) and Neira, Exposito and Aguayo(1998).

Our analysis is also based on the experience of economic growth in OECD countries during the second half of twentieth century, which demonstrates the key role of education on development. This importance arises not only from a purely economicist point of view but also from the perspective of social and political wellbeing. Only with more emphasis on education, together with investment and international cooperation, the less developed countries of Latin America can reach higher standards of wellbeing, peace, freedom and a substainable development.

International help in education and investment is essential for Latinamerica take off in this circunstances. EU should, in our opinion, have an important presence in this process, together with other countries and international institutions. Spain has an important role to play, because the languague community and their historic links with many of these countries, but unfortunately this role has not been very much developed up till now.

1.- INTRODUCTION

For many years we have made an intense and deep research on the role of education in economic and social development. In Guisan(1976a) and (1976b) an international comparison of educative levels and growth, with OECD countries data, was performed using econometric models that show the high degree of complementarity existing between human and physical capital, and the important role of education in order to improve economic growth.

More recently we have followed some interesting approaches to the explanation of regional differences in European Union, as with our work Guisán and Frías (1996), in which human capital, measured by PS2 (percentage of population over 25 with upper-secondary education or higher) showed an important role in improving socio-cultural enviroment, which is a main factor in order to develop iniciatives and increase investment. We have also made international comparisons, specially in America, in several studies

such as Guisan(1997), Neira(1999), Neira, Guisan and Aguayo (1999) with a new econometric perspective that emphasizes the role of education as an accelerator of investment in physical capital, and thus, its great importance in the improvement of both human and physical stocks of capital.

With different analysis the great majority of researchers in this field conclude, as we do, that education at all levels is fundamental for development: primary school is essential for moderating birth rates in countries with excessive demographic increases, secondary school is basic to bring up to day productive sectors and for improving socio-cultural environment that improves socio-economic initiatives for investment and development, and higher education is essential for high level jobs and responsibilities in engineering, and in socioeconomic or other areas.

In next sections we present the situation and evolution of human capital in American countries, analyse the relation between education and investment and the human capital contribution to the development.

Our conclusion is that EU countries should cooperate more with Latin American countries. Therefore, we make some critical comments on the insufficient cooperation that Europe is establishing at the moment with universities and other organizations that in both edges of the Atlantic ocean are trying to build a cultural bridge between them.

2.- ECONOMIC GROWTH IN LATIN AMERICA.

In table 1 we present the evolution of population and Gross Domestic Product (GDP) in Latin America countries in the period 1960-90.

Table 1

Evolution of population and Gross Domestic Product (GDP) in Latin America countries in the period 1960-90

	GDPH			POB		
	1960	**1990**	**T**	**1960**	**1990**	**T**
BRD	2666	7664	3.35	231	257	0.37
CAN	7258	17173		17910	26522	1.34
CRI	2096	3499	1.68	1254	2994	2.96
DOM	1195	2166	2.00	3325	7074	2.50
SLV	1427	1824	0.86	2578	5172	2.26
GTM	1660	2127	0.95	3887	9197	2.91
HTI	924	834	-0.32	3857	6346	1.73
HND	1039	1377	0.90	1934	5105	3.27
JAM	1773	2545	1.00	1622	2356	1.2
MEX	2836	5827	2.5	38227	81724	2.53
NIC	1606	1294	-067	1578	3676	2.85
PAN	1575	2888	2.37	1145	2418	2.49
TTO	5627	7764	1.2	776	1236	6.24
USA	9895	18054		180673	250372	1.0
ARG	4462	4706	0.17	20618	32322	1.41
BOL	1148	1658	1.27	3428	7172	2.49
BRA	1784	4042	2.46	72594	149042	2.38
CHL	2885	4338	1.66	7695	13173	1.8
COL	1684	3300	2.2	15754	32300	2.38
ECU	1461	2755	2.09	4563	10547	2.79
GUY	1596	1094	-1.17	538	798	1.32
PRY	1177	2128	1.94	1825	4277	22.87
PER	2019	2188	0.11	9936	21512	2.49
URY	3968	4602	0.84	2538	3094	0.64
VEN	6338	6055	0.35	7303	19325	3.23

Note: T= Annual rate of growth
Source: Summer and Heston (1991)

We can observe that the increase in population has been excessive in relation with the increase of GDP and thus the GDP per head (GDPH) has show a clear stagnation or a very moderate increase in most of these countries.

All these countries have a GDPH value in international comparison, both using exchange rates (ER) and purchasing power parities (PPP), much lower than the OECD

average. The highest levels correspond to Argentina, with 8920$ per head in 1994 PPP, Chile with 9060$ PPP, Mexico with 7050 $ PPP, Panama with 6080$ and Venezuela with 7890 $ PPP. At a lower stage with GDP per head next to the world average (see Guisán (1997) and Cordelier (1997)) are the following countries: Brazil (5630 $), Colombia (5970 $) and Costa Rica (5760 $).

The lowest levels, under world average, correspond to Bolivia (2520 $), Dominican Republic (3790 $), Ecuador (4380 $), El Salvador (2510 $), Honduras (1900$), Nicaragua (1850 $), Paraguay (3540 $) and Peru (3690 $).

The average of these 17 countries was in 1994 a little lower than world average.

The causes of the low levels of many countries and the scarce increase of GDPH in most of them are very much related with the low educative level of many people and the political and socio-cultural environment that result from the interaction between economic conditions and education.

The economic situation of the Latin America countries has shown great differences in the last years. On the one hand, some countries such as Mexico have undergone a strong economic growth, whereas in some others as Nicaragua, Venezuela or Peru the economic growth was feeble, and even negative as in Nicaragua.

The unstable politic situation lived in these countries along the whole period and the strong increments of their populations are the two determining factors when analysing their evolution in the last thirty years.

The huge growth of population of the Latin America countries in the last thirty years has meant, for most of them, an increment of population of more than 100% from 1960 to 1992. Their average annual rate of growth of near 3% was three times higher than the corresponding to the most developed OECD countries which was of 1% in the same period. This is one of the main factors that explain that countries as Mexico, which has

gone through an enormous growth of its GDP, has not experienced bigger increases in its GDP per head.

The economic development of these countries needs an stronger growth of GDP, coupled with a decrease of birth rates, which in some countries is more than three times bigger than those of the more developed countries in the OECD.

This economic growth generally only will be improved if education receives the necessary help from OECD countries. In this field, it is necessary a greater European cooperation, specially from the EU.

In section 3, we analyse the evolution of the educative level in the Latin American countries, and in section 4 and 5 the role of education in development, having into account the effects it has on increasing investment and productivity and its effect on lowering the excessively high birth rates.

We finish the paper with section 6 and 7, in which we analyse the possibilities of the EU development aid policy in Latin America and present our conclusions

3.- EVOLUTION OF EDUCATIONAL STANDARDS IN AMERICAN COUNTRIES.

In this section we will study the evolution of the educational standards of these countries along the period considered. First of all, assessing which countries had experienced the stronger increments in educational standards, and then, analysing the relationship between educational standards and economic and population growth.

This analysis is made for 23 Latin American countries. Besides, we have included the two more developed economies in the continent, USA and Canada, in order to establish some comparisons. The inclusion of USA and Canada will allow us to observe clearly the

gap among the less developed countries of America with the USA, which in relation to economic development and specially to human capital is located among the more privileged economies in the OECD.

Among the bigger countries, Mexico and Venezuela stand out in relation to their human capital figures. The former, as it could be expected for the evolution of its GDP per head and per worker, goes from a percentage of active population with upper secondary and universitary studies of 6% to 32.6%, which is over the percentage of Spain, that according to BARRO and LEE is about 31%. Venezuela, which was at a low level at the beginning of the period, also experienced an important expansion, reaching in 1990 to the more developed counties of the continent.

Table 2

Population over 25 with an educational level over upper-secondary level. (Latin America)

	1960			1990		
	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
BRD	17.20	19.00	16.00	49.60	52.00	47.70
CAN	51.00	48.30	53.80	83.40	83.50	83.30
CRI	10.40	10.40	10.30	25.40	24.60	26.30
DOM	3.50	4.20	2.80	20.20	21.70	18.70
SLV	5.10	5.80	4.40	10.70	12.90	8.80
GTM	4.20	4.80	3.60	10.40	11.40	9.30
HTI	4.40	5.40	3.50	10.40	13.90	7.30
HND	4.10	4.70	3.50	15.50	15.40	15.60
JAM	6.00	6.20	5.80	31.70	29.90	33.20
MEX	5.70	6.60	4.80	32.60	35.70	29.70
NIC	7.20	8.20	6.20	13.60	13.70	13.60
PAN	18.00	18.80	17.20	45.50	44.30	46.70
TTO	13.50	15.50	11.50	32.10	32.70	31.50
USA	60.30	58.20	62.30	89.60	88.70	90.40
ARG	14.60	16.90	12.30	37.30	38.40	36.30
BOL	34.90	42.60	27.60	20.40	26.60	14.60
BRA	14.10	14.50	13.80	11.90	11.70	12.00
CHL	24.50	25.90	23.20	34.80	34.60	35.00
COL	13.80	14.90	12.60	23.90	20.00	27.40
ECU	8.50	10.00	7.00	27.00	27.00	27.00
GUY	2.70	5.20	0.40	32.30	33.10	31.60
PRY	8.10	10.90	5.50	19.20	20.30	17.90
PER	12.30	15.30	9.30	31.60	31.50	31.80
URY	21.90	22.70	21.10	38.30	36.00	40.30
VEN	6.80	9.10	4.50	23.80	24.20	23.40

Source:Barro and LEE (1991 and 1996)

On average the gap between Latin American countries and the most developed OECD countries is still considerable, although the level of some of them is close to the OECD average which is about 54%, according to the data of this international organization. The human capital endowment of these countries was on average of 32% in

1990, percentage close to that for Spain in that year, and which was well over the OECD average for 1960, being closer to the OECD average of 1990 (54%). Human capital growth was in these countries similar to that experienced for the less developed OECD countries, which as it was mentioned above were trying to catch up the human capital level of the most developed. This has had the consequence that this group of countries has reached a desirable human capital level in order to undergo a sustainable economic growth and to reduce the economic gap with developed countries.

Educational standards of male and female members of the active population are similar in most of the countries, although they are slightly higher for male population. The differences are a bit larger in the countries with lower educational standards.

In connection with educational levels, the evolution of universitary and upper-secondary was rather unlike, as universitary education, which was at a very low stage at the beginning of the period, underwent the strongest increases.

In relation to secondary education, the countries with a larger endowment of the other production factors as the physical capital (Argentina, Chile, Colombia, Mexico..) are also some of which have the highest educational standards in their active population. However, some small countries as Uruguay or Trinidad Tobago reached similar figures. With regard to the growth experienced from 1960 to 1990, only Brazil and Bolivia, according to these data, worsened their positions in relation to the start of the period. Nicaragua and Ecuador keep their low percentage of 1960 steady. In the other countries the increases were high, being for most of them of more than 100% with respect to their 1960 percentages.

Finally, in relation to illiterate population, whereas in developed countries almost 100% of population without upper-secondary education has at least primary or secondary education, this is not the same for less developed countries as these of Latin America.

Table 3

Illiterate population over 25. (Latin America)

	1960			1990		
	TOTAL	**MALE**	**FEMALE**	**TOTAL**	**MALE**	**FEMALE**
BRD	0.00	0.00	0.00	1.90	1.60	2.20
CAN	1.70	1.70	1.70	1.00	0.90	1.10
CRI	17.40	17.60	17.30	12.80	12.10	13.50
DOM	43.40	40.00	46.90	43.80	41.10	46.50
SLV	61.80	56.80	66.60	34.90	31.70	37.70
GTM	69.70	65.20	74.20	52.70	46.80	58.50
HTI	90.20	83.70	96.10	61.70	42.50	78.80
HND	60.90	55.90	65.90	32.10	31.40	32.80
JAM	18.80	21.60	16.40	4.20	4.30	4.00
MEX	46.00	40.60	51.20	18.80	16.10	21.40
NIC	59.00	58.60	59.50	42.20	38.00	46.30
PAN	28.00	27.50	28.50	12.90	12.00	13.80
TTO	14.70	10.20	19.10	5.60	6.30	5.00
USA	2.30	2.40	2.20	1.20	0.30	2.00
ARG	12.00	10.50	13.60	5.70	5.20	6.20
BOL	44.90	24.90	63.90	40.80	30.60	50.20
BRA	43.10	37.30	48.80	22.40	22.40	22.40
CHL	20.20	18.50	21.80	8.00	7.10	8.90
COL	35.10	31.90	38.00	24.50	27.20	21.90
ECU	37.80	32.00	43.40	24.00	21.10	26.80
GUY	13.30	8.40	18.00	10.80	9.30	12.30
PRY	26.40	18.40	33.80	13.80	10.60	17.00
PER	42.80	29.20	56.30	22.40	13.80	30.80
URY	13.10	11.60	14.60	5.50	6.60	4.60
VEN	49.10	42.20	56.20	21.20	19.50	22.90

Source:Barro and LEE (1991 and 1996)

Analysing the situation of education as a whole, in 1990 only two countries among the most populated in Latin America had an active population, which although needed the generalization of primary and secondary level education to the whole population, were close to the most developed OECD countries, these were Argentina and Chile. The

percentage of illiterate population was in 1990 close to the 6 and 8%, respectively, which is quite far from the average of 20%. Besides, although population with primary level education is still high in both countries (over 50%), population with upper-secondary and universitary level education is in a situation comparable to that of Spain.

Dominican Republic, El Salvador, Haiti, Honduras, Bolivia, Nicaragua and Guatemala stand out for their high percentage of illiterate population, which is well over the 30%. Anyway, we should bear in mind that illiterate rates between 10% and 30% are also extremely high. In this connection, it would be very important that developed countries made an effort in order to help Latin America to solve its problems of schooling of children and teaching literacy to adults.

The small countries and isles such as Barbados, Costa Rica, Guayana, Jamaica, Trinidad Tobago or Uruguay, are those with more literate populations. However, most of the population only reaches primary education, as happened in the two countries mentioned above, thus their situations are quite similar and their needs of a generalization of primary and secondary education also applies.

In most of the countries their low income per head, political instability and the conflicts that strike population had conformed a distressing economic outlook in all respects including human capital. The necessity of its expansion in order to favour the economic development of these economies is conditioned at a big extent by the aforementioned social factors. The economic aid that these countries are demanding should provide not only the endowment of the essential physical elements that they need but also an important help in order to develop their human capabilities. The availability of internal human capital is a main factor in order to reach an steady path of economic growth. This issue which has proved crucial in developed countries, must also be addressed in less developed countries which need to promote their human capital in order to overcome their economic backwardness.

Mexico is a bit far from the general trend. In spite of the fact that its percentage of illiterate population is very high in relation to its economic situation, in some other respects is close to the most developed OECD countries, as for its percentage of

universitary population. Anyway, it seems that this extremely high percentage of illiterate population will not help to improve the balanced distribution of its growing wealth, as far as educational differences explain differences in productivities and wages.

4.- THE ROLE OF EDUCATION IN INVESTMENT AND PRODUCTIVITY GROWTH

The contribution of education to economic development is a fact that has been proved in many empirical analysis, in which it has been shown the positive effect that the education of active population has over economic growth. From the seminal research on human capital to the more up to day theories of endogenous growth, education has been considered as an additional input in the production function, with a positive effect over the GDP growth. An increase in the stock of physical capital per head implies an increment of qualified labour demand. Besides, as it was mentioned above, the increment of educational standards has as a consequence a better socio-cultural environment, which is a main factor to favour innovation and investment, Guisan y Frias (1996).

A detailed analysis of these pieces of research can be found in Neira (1998), as a summary we can point out that this effect is considered in the traditional way through a Cobb-Douglas production function in which human capital, usually measured by the percentage of population that has reached a certain level of education, has a positive contribution on the growth of GDP per head.

Empirical research works done according to these principles has not always produced significative results. In fact, in many of them, education is not significative in order to explain the evolution of GDP, which has been explained many times through the interaction between human capital and R&D, pointing out the possibility that human capital operate through the R&D instead of been an additional input in the production function.

In Neira, Guisán and Aguayo (1999) an alternative proposal is made, which is the interaction between human and physical capital, previously hinted at by Barro (1991, 1996) or Romer (1990) in their research works. In this work, an equation connecting physical and human capital was estimated for 10 American countries (Argentina, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Peru and Venezuela).

The estimation output was as follows:

KAPH = 1.02 KAPH (-5) + 11.17 PS2
t-stat (20.97) (2.1)
$R^2 = 0.90$

KAPH: Stock of physical capital per head.
PS2: Active population with upper-secondary education level or over.

The results confirm the initial hypothesis about a positive interaction between human and physical capitals, which imply an indirect effect of human capital in the production function through the effect that it exert over physical capital.

5.- DEMOGRAPHIC CHANGE.

The role of education over the reduction of natality rates is evident in developed countries, in which the incorporation of women to work and the higher educational level of population, specially of female population, has contributed towards this decrease, which in some countries has reached alarming figures that are demanding a new policy aimed to promote a rise of natality rates.

In some pieces of research, as those of Barro (1991), Becker, Murphy and Tamura (1990), Foster and Rosenzweig (1996) or Arranz, Freire and Guisán (1997), a negative correlation between the fertility rates, the economic growth and the human capital of the countries was observed.

In the following table, the percentages of female population over 15 in 1960 and in 1985 are shown, it is also presented the relationship between these percentages and fertility rates. We present the female population over 15 because in developing countries women start to have children at this age, which is below 25, the age traditionally considered to typify active population. The differences between the educational level of population over 15 and 25 are smaller than it was assumed by many authors, who pointed out this fact as one of their main critics against the first Barro & Lee database of 1991. Comparing both of them, population over 15 and over 25, we get the same results, which was expected in the case of developed countries, but which also occurs for developing countries.

Table 4

Female population over 15 in Latin America, fertility and education.

	1960			1985		
	FERTILITY	ILLITERATE	UPPER SECONDARY	FERTILITY	ILLITERATE	UPPER SECONDARY
BRD	-	1.5	15.70	-	2.30	42.70
CAN	3.81	1.4	80.20	1.66	1.10	82.70
CRI	7.01	16.60	11.50	3.36	10.50	28.70
DOM	7.35	37.30	3.50	3.93	39.70	26.20
SLV	6.83	60.00	6.10	5.00	33.00	10.00
GTM	6.88	72.40	4.10	5.91	52.60	12.00
HTI	6.15	92.00	4.90	4.87	71.10	10.30
HND	7.29	60.00	4.70	5.79	38.60	12.40
JAM	5.27	13.60	7.20	3.06	3.00	35.80
MEX	6.75	43.90	6.90	3.83	25.50	28.10
NIC	7.33	56.00	7.10	5.68	40.20	16.50
PAN	5.90	23.20	20.60	3.27	14.10	42.80
TTO	5.12	14.70	14.70	2.96	2.60	40.60
USA	3.65	1.90	62.80	1.84	1.30	93.90
ARG	3.11	11.40	16.10	3.04	5.60	35.10
BOL	6.65	54.00	35.30	6.14	43.00	22.40
BRA	6.15	44.10	17.70	3.60	27.50	14.10
CHL	-	18.40	25.30	-	8.20	41.70
COL	6.72	33.10	14.90	3.31	15.30	31.60
ECU	6.91	37.40	9.30	4.60	21.00	34.10
GUY	6.14	16.90	9.60	3.14	7.60	32.20
PRY	6.80	26.90	8.00	4.67	13.80	22.70
PER	6.85	50.20	11.50	4.23	24.50	38.50
URY	2.87	12.90	23.90	2.67	3.10	45.00
VEN	6.46	48.00	7.00	3.90	16.90	37.40
CORRELATIONS						
Year 60: FERT * Illiterate female population = 0,62 FERT * Upper secondary level = -0,61				Year 90: FERT * Illiterate female population = 0,81 FERT * Upper secondary level = - 0,79		

Source: Barro and LEE (1991 and 1996)

At the bottom of the table the correlations between fertility rates of Latin American women, and the percentage of illiterate female population and the percentage of female population with an educational level over upper-secondary in 1960 and 1985 are presented.

Correlation between fertility and education is negative in both years, higher in 1985 than in 1960, reaching a value of -0.79. On the other hand, correlation between fertility rates and illiterate population is positive, being the coefficient of correlation of 0.81 in 1990.

In order to complete the analysis, we have estimated an econometric model with panel data for the five year periods between 1960 and 1985 and 23 Latin American countries (the countries in table 3, except BRD and CHL for which we did not have fertility data).

Table 5

Regression of fertility rates on GDP per head and educational standard of population (Latin America).

Dependent variable: LOG(fertility rate) N=23 countries T=6 years.			
MODEL 1		MODEL 2	
C	Fixed effects for each country	C	Fixed effects for each country
LOG(PIBH)	-0.36 (0.06)	LOG(PIBH)	-0.46 (0.06)
LOG(PS2)	-0.22 (0.03)	LOG(NO)	0.17 (0.03)
R^2	0.90	R^2	0.88

* Standard deviation between brackets.

Estimation output shows a positive and significative elasticity of 0.17 of illiterate population over fertility rate. On the contrary, the elasticities are negative for population with more than upper-secondary education level. In both models, which show a high goodness of fit, GDP has a negative effect on fertility rates.

6.- EUROPEAN COOPERATION WITH LATIN AMERICA.

Due to the historical and present relations between Latin America and the EU, specially with Spain and Portugal, is very important to strengthen cooperation in education and cultural affairs. However, despite the fact that some European political authorities make continuous pronouncements declaring their will of cooperation, the aid is in general scarce, at least from Spain and the EU as a whole. In this connection, Europe only receive the 25% of the 200.000 universitary students from LDCs, which is obviously a very small number.

The problem in not a matter of the demand that Latin American students would made of postgraduate courses in Europe, which would be considerable, but of the grants they need in order to support their stays. Cooperation in this field is crucial to favour the economic development of the area because postgraduate courses are those in which it can be performed more efficiently.

Another issue that deserved to be pointed out is the scarce aid to the edition and diffusion of European books in Latin America, specially in the languages spoken in the region.

Europe not only should have a cooperation policy targeted to profitable business but also a more global policy aimed to other areas such as education, health, culture... This cooperation policy should also be implemented in its relations with other LDCs.

7.- CONCLUSIONS

1) The main target of educational policy in Latin America must be the generalization of education to all the population. The high illiteracy rates, over 20% in the average (reaching the 60% in some countries), are demanding an effort in this area in order to reach a sustainable economic growth in these countries. It is probably in this field in which Spain and the EU can make their main contributions to America.

2) The percentage of active population with a level of education over upper-secondary is on average around 32%. The increase in the number of people that have reached this level of education was very important in the last years. However, universitary education keeps on being for minorities in these countries, although in some of them its level is similar to the level of illiteracy, which could be indicating a high social inequality for most of these countries.

3) The existence of a strong negative correlation between fertility rates and educational standards, explain that education must be considered as one of the essential factors in order to reduce the birth rates of these countries.

4) The elasticity of fertility rate over female population with an educational level over upper-secondary is negative and over illiterate female population is positive, being larger the former than the latter.

5) The increase of educational level in Latin America has a significative influence over the increment of physical capital, which is essential to economic growth. Therefore, it is extremely important to improve the educational level of population in these countries.

6) Educational and cultural aid of the EU is scarce, and some comments in this issue are made in section 6.

8.- REFERENCE LIST.

- ARRANZ, M.; FREIRE, MªJ., GUISÁN SEIJAS, MªC., (1997) "An International Comparison of Education, Growth and Employment" AEA Applied Econometric Association. Maastrich, 14-16 may.

- BARRO, R. J. (1991) "Economic growth a cross section of countries" The Quarterly Journal of Economics", May 1991, pgs 407-443.

-BARRO, R and LEE, JONG-WHA (1996) "International Measures of Schooling Year and Schooling Quality" American Economic Review. Papers and Proceedings. Nº 86 (may) pgs 218-223.

-BARRO, R and LEE, JONG-WHA (1997) "Schooling quality in a cross section of countries" NBER Working Papers Series Nº 6198.

-BARRO,R. (1997a) *Determinants of Economic Growth*. The MIT Press, Cambridge, Massachusetts.

- BLAUG, M. Y MORENO,J.L. (1984) *Financiación de la educación superior en España y en Europa.* Siglo XXI, Madrid.

- BECKER, MURPHY and TAMURA (1990) "Human capital, fertility and economic growth" Journal of Political Economy, vol 5, pgs 12-37.

- BENHABID,J. y SPIEGEL, M (1994)"The role of human capital in economic development. Evidence from aggregate cross-country data" Journal of Monetary Economics, nº 34, pgs 143-173.

- CORDEIRO, J.L. (1998) *El desafío Latinoamericano*. McGraw-Hill Interamericana.

-CORDELIER,S; DIDIOT, B (1997) *"El estado del mundo 1997*" Ed. Akal. Madrid

-FOSTER, A. D. and ROSENWEIG, M. (1996) "Technical change and human-capital returns and investments: evidence from the Green Revolution" The American Economic Review, vol 86, nº 4, pgs 931-953.

- GUISÁN SEIJAS, MªC. (1976a) "La heterogeneidad del factor trabajo y la función agregada de producción. Un análisis teórico y empírico "Revista española de economía, septiembre-diciembre 1976, pgs 247-256.

- GUISÁN SEIJAS, MªC (1976b) "Nivel educativo de la población activa y evolución del empleo en España " Económicas y empresariales. UNED, pgs 140-149.

-GUISÁN SEIJAS, MªC. and FRIAS PINEDO, I. (1996) " Economic Growth and Social Welfare in the European Regions" European Regional Science Association, 36 th, European Congress, Zurich.

-GUISÁN, MªC. and CANCELO, Mª T. (1997) "Educación, inversión y competitividad en los países de la OCDE 1964-94" Documentos de Econometría Nº 13. Universidad de Santiago.

-GUISÁN, Mª C. (1997a) "Economic growth and education: a new international policy".22nd SID World Conference. Santiago de Compostela, may 1997.

-GUISÁN, Mª C. (1997b) Econometria. McGraw-Hill.

- NEIRA, I, GUISÁN , Mª.C. (1999) Educación y crecimiento: Modelización de los efectos directos e indirectos. Documentos de Econometría Nº 16. Universidad de Santiago. http:\\www.usc.es\economet

- NEIRA, I, GUISÁN , Mª.C. AGUAYO, E. (1999) *Perspectivas de crecimiento económico en América Latina*. http:\\www.usc.es\economet

-ROMER,P.M. (1990) “Endogenous technological change” Journal of Political Economy, vol 98,nº 5, pgs 71-101.

- SUMMERS, R. and HESTON, A. (1991) " The Peen World Table (mark 5): and expanded set of international comparisons, 1950-1988." The Quaterly Journal of Economics", May 1991, pgs327-367.

APENDIX. LIST OF LATIN AMERICAN COUNTRIES.

BRB	Barbados
CAN	Canada
CRI	Costa Rica
DOM	Dominican Rep.
SLV	El Salvador
GTM	Guatemala
HTI	Haiti
HND	Honduras
JAM	Jamaica
MEX	Mexico
NIC	Nicaragua
PAN	Panama
TTO	Trinidad & Tobago
USA	United States
ARG	Argentina
BOL	Bolivia
BRA	Brazil
CHL	Chile
COL	Colombia
ECU	Ecuador
GUY	Guyana
PRY	Paraguay
PER	Peru
URY	Uruguay
VEN	Venezuela